REMARKS

Claims 3 – 8, 10 – 13 and 15 remain pending in the present application. No amendments were made by the present response. Reconsideration of the claims is respectfully requested in view of the following discussion.

Rejections under 35 USC § 103

Claims 3, 4, 10-13 and 15 were rejected under 35 USC § 103 over the applicant's admitted prior art (APA) in view of **Imaizumi** (USP 5, 326,717).

With regard to the thickness of the intermediate layer being "about 4nm" (claim 10) and "*of* 4nm" (claim 15), the Office Action asserted that the applicants' calculations were incorrect. In particular, the Office Action stated that "applicants' calculations are based on the faulty premise of equating the TiO_2's lattice constant dimension with its unit-cell dimension ... these characteristics are different and have complete different length." However, these allegations are incorrect. The Office Action further alleged that the lattice constant of TiO_2 of 4.593 Å is the thickness of one molecular layer of TiO_2. This is also incorrect since the Office Action did not consider the actual crystal surface orientation of a TiO_2 film, as explained below.

Filed concurrently are an Information Disclosure Statement (IDS) and 2 cited references that provide clarification of the relationship between TiO_2's lattice constant, unit-cell dimensions, and thickness of a molecular layer.

First, there is a 1998 article from the American Physical Society entitled "Ground-State Properties of Rutile: Electron-Correlation Effects" which describes a single primitive unit cell of TiO_2 (Figure 1) as having 2 titanium atoms and 4 oxygen atoms, with two lattice constants a and c. Lattice constant $a = 4.592$ Å and lattice constant $c = 2.958$ Å. It appears that lattice constant b

is equal to *a*, therefore the unit cell depicts the same lattice constant *a* for both the x and y lattice edges.

The question at hand is how to determine the conventional thickness of a "monolayer" disclosed in **Imaizumi**. As can be appreciated from the unit cell dimensions of TiO_2 , the thickness of one molecular layer depends on the orientation of the unit cell. In particular, the thickness of one molecular layer depends on the surface of the TiO_2 unit cell being used to form the surface of the TiO_2 molecular layer.

Accordingly, the IDS provides a second 1998 article, this one from Surface Science entitled "Characterization of Ca Impurity Segregation on the TiO_2 (110) Surface." This article describes the conventional orientation of TiO_2 layers as having a TiO_2 (110) surface. This suggests that the thickness of one monolayer would be the thickness between adjacent (110) surfaces, as identified in the attached hand-drawing in Appendix A.

Basically, with the conventional orientation of TiO_2 layers as having a (110) surface, the thickness of one monolayer must be less than the value of lattice constant *a*, but more than the value of lattice constant *c*. In particular, the thickness of one monolayer of TiO_2, oriented in the conventional direction to have a (110) surface, would be $1/\sqrt{2}$ times the lattice constant *a*, which would result in a value of 3.247 Å. Ten monolayers of this would be approximately 3.247 nm.

The Abstract and column 2, lines 50-54 of **Imaizumi** indicates that ten molecular layers is the ***maximum*** thickness. Since ten molecular layers of TiO_2 is only approximately 3.247 nm, the cited prior art teaches away from the present claimed intermediate layer having a thickness "about 4nm" (claim 10) and "of 4nm" (claim 15). Basically, **Imaizumi** clearly teaches away from the subject matter of the present invention. For at least these reasons, the present claimed invention patentably distinguishes over the prior art.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact the undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees that may be due with respect to this paper to Deposit Account No. 50-2866.

Respectfully Submitted,

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP

John P. Kong
Attorney for Applicant
Registration No.: 40,054

Enclosures: Appendix A;
Information Disclosure Statement and 2 References

JPK:kal
1250 Connecticut Avenue
Suite 700
Washington, D.C. 20036
(202) 822-1100
Q:\2000\001701\Filings\Request for Reconsideration - May 2004.doc